



Bilkent University
CS 319 - Object-Oriented Software Engineering
Requirement Analysis Report
Group “Veni Vidi Code”

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1. Introduction

Gym usage in Bilkent University has always been maintained in the traditional way of handling all the needs with phone calls. Even though this sounds fairly simple at first, it might not be easy to keep track of everything and manage the programs and the reservations just by phone calls and using pen and paper.

Hence we felt the need for a simpler and better system and developed a web-based application which would make things easier not only for gym users but also for the gym staff. With this application, gym users can easily make reservations for gyms and participate in tournaments, while having an individual profile where they can record their personal information and request a gym program according to their needs. Gym staff on the other hand can keep track of the reservations, and also handle the gym usage by determining opening hours and a maximum number of reservations for a given time interval or a sports activity. They can also keep an eye on the users who do not show up for their reservations and restrict them from gym usage if it is necessary.

2. Proposed System

This application aims for having the simplest user interface with many various functionalities whose information was gathered by an interview with gym personnel (See Appendix A). All the students and the gym staff will be given accounts as Gym Member and Gym Staff respectively, created by the Admin user who is responsible for all the account creation and deletions.

Once a user logs in to the application with their accounts, they will find themselves on the home screen in which they can easily see and find any further operation. Gym members will have all the options from using the gym by making and canceling reservations to using sports facilities such as tennis courts or the football pitch. They can also register to available tournaments or request a personal gym program from the gym staff with only a few button clicks.

Gym staff on the other hand can see the details of all the reservations and adjust their daily life accordingly. Other than monitoring reservations and member-related options such as viewing members' profiles or checking all the members participating in a certain tournament; they also have all the authority to determine and edit gym and sports activity-related information such as determining the maximum number of members who can attend to a sports activity or determining the opening hours for the sports hall since there might have the need to make changes in some special situations such as holidays.

All users can easily achieve these functionalities in a few clicks and make all the operations they want to in a fairly short time.

2.1 Functional Requirements

2.1.1 Actor Types

2.1.1.1 Admin

Admin actors are responsible for the account management of the system. They create accounts of the GymStaff and GymMember. They can also delete the accounts of these actors.

2.1.1.2 GymStaff

GymStaff actors represent the existing sports instructors in the sports centers. They manage the reservations, tournaments, and sports courses that are taking place in sports centers. They also make announcements on the system.

2.1.1.3 GymMember

GymMember actors represent the users of the sports center. They make reservations to do sports activities and they enroll in the courses or register to tournaments. They have three types: student, instructor, and alumni.

2.1.1.4 Alumni

Alumni actors represent students that are graduated from the university. They can use Dormitories Sports Center if only they make payments before midday. They can use Main Sports Center and East Sports Center for free during the day. After that, they can use sports centers at their reservation time. They also have to make a payment for enrolling in courses.

2.1.1.5 Student

They are the students that are currently studying at the university for a bachelor's or master's degree. They can use sports centers at their reservation time without any extra requirement.

2.1.1.6 Instructor

They are the teachers that are currently teaching at the university. They can use sports centers if only they make payments. After that, they can use sports centers at their reservation time. They also have to make a payment for enrolling in courses.

2.1.2 Login

In order to access the system, all of the actors must be verified with their correct login credentials. If they successfully login, they will be able to use the system.

2.1.3 Make a Reservation

Gym members can make a reservation by using this function. They can specify the time slot, sports activity, and the location which they want to make a reservation to.

2.1.4 Participate in a Tournament

Users have the option to participate in a tournament they wish to. From the list where all the available tournaments added by the gym staff are listed, users can choose a tournament and apply individually or form a team and then participate.

2.1.5 View Profile

Gym members can view their profiles and change/edit their attributes if they want to. Gym staff also have the option to view a member's profile so that they have a better understanding of the member if they ever need to write a personal gym program for them.

2.1.6 Request a Personal Gym Program

Gym members can request a personal gym program simply by clicking a button and this request can be seen by gym staff. Gym staff can then form a program for that user by visiting their profile and according to the user's personal attributes.

2.1.7 Cancel Reservation

Gym members can have the option to cancel a reservation they made earlier by simply clicking a button. This will also remove the reservation from the reservations list. Gym staff also have the option to cancel a member's reservation in the case of an inappropriate situation.

2.1.8 View Reservations

Both gym members and the gym staff can see all the reservations made, and make their program accordingly. While gym members can only see the reservations made by them, gym staff can see all the reservations made by any gym member.

2.1.9 View Gym Program Request

Gym staff can see all the gym program requests from all the users. Gym staff can also have the option to view the profile of the user who requested a gym program.

2.1.10 Send Gym Program

Gym staff can also write and send a gym program according to the special requests of the gym member.

2.1.11 Determine Gym Specifications

Gym staff can have all the options related to gym and sports activities' properties. They can determine the maximum quota for an activity, determine opening hours for the gym and sports facilities (since there can be changes during holidays) and determine the latest day a member can make a reservation for a specific activity.

2.1.12 Tournament Operations

Gym staff can have the ability to announce a new tournament that will be visible for the gym member on the application. Also, gym staff also have the ability to view the participants of the tournaments.

2.1.13 Restrict Gym Member

Gym staff can restrict a gym member from using the gym and applying sports activities, in the case of inappropriate behavior or if the member does not show up for their reservations multiple times.

2.1.14 Add User

Admin user has all the authority to create an account for the system. Admin users can add a new user as a Gym Member or Gym Staff to the system by their email address, and this account can be later used by the user to login to the system. This functionality is most likely to be used when a new student enrolls to the university or a new gym staff is hired.

2.1.15 Delete User

Admin user also has the authority to delete an account from the system, by specifying whether they want to delete a Gym Member's or Gym Staff's account. This functionality is most likely to be used when a student graduates or a gym staff resigns.

2.1.16 Enroll To A Course

Users can enroll to a sports course that takes place on the campus. They can see the available courses listed such as tennis course, swimming course, yoga course, etc, and enroll to the one that they desire, as long as there is an available quota.

2.1.17 Make Payment

Instructor and Alumni types of users need to make a payment in order to use some of the sports facilities. This function allows them to make payments to enroll to a course or make reservations by using an external payment system.

2.1.18 View Notifications

Gym members may receive notifications as a result of some operations they perform, and they have the ability to view all the notifications they receive.

2.1.19 Additional Requirements

It was necessary to add some new functions to our application to meet all the needs. For example, we added new types of users as Alumni, Student, and Instructor; instead of having one general user as GymMember. This allowed us to implement new functions according to the user type, such as making a payment option for Alumni and Instructor type of users, since their gym usage is charged in some cases. Also, now the users are able to cancel their registration for a tournament, in case they want to withdraw as a result of some personal reasons. Additionally, there is the addition of sports courses inside our application. As an addition to tournament logic, gym staff can now add and cancel sports courses as well, which represents courses such as tennis, yoga, etc. Similarly, gym members now have the option to enroll to and withdraw from a course. Moreover, gym staff was only able to view gym program requests sent by the gym members. Now, gym staff can also write a gym program according to the requests of the members and send it via the application. Also, notification function is added. Gym members now receive notification as a result of some events, such as when gym staff writes a program for the gym member's request, that gym member will be notified and they will be able to see all the other notifications as well from the notification section.

2.2 Non-functional Requirements

2.2.1 Usability

Since the aim of creating this system is to ease the management of the reservations and tournaments for Bilkent Sports Center staff and easing the appointments for the activities for Bilkent members, a usable and practical system is required. Users of the system should benefit from the system more than the ongoing system. The system will consist of non-complex processes and UI components to enhance the experience of users. Also, whenever the user is required to enter input, they will be guided accordingly to the input type; such as if the required input is a type of a number, the user will not be able to enter a text. Whatever the screen size is, the font size will never be less than 14 pt, so that the texts will be easily readable by the user. In addition, the dimensions of the buttons never will be less than 7% of the screen. Moreover, the system will be simple and understandable as much as possible by implementing the UI according to the conventional methods that are common for many applications, and familiar to many users. In order to find data, users will be able to search certain data (such as for reservations) that will enable them to find the specific information they are looking for. This will ensure that users will access their desired information easier and faster, which will increase the usability overall.

2.2.2 Reliability

All the information and credentials related to a user will be stored privately. For example, the passwords of the users will be stored in an encrypted form. Also, possible errors or exceptions will be handled in order to prevent unwanted side effects or program crashes. For example, when

a user tries to update their information, the system will handle the situation in a way that it prevents the corruption of other unrelated data. Also, in order to handle program crashes, the system will try to catch false data and won't allow this data to be stored, which will prevent system crashes.

2.2.3 Response Time

Since we are trying to create a platform which aims to provide a faster way of managing sports-related activities, the response time must be low. In order to ensure this, several requirements need to be ensured. If a user tries to make a reservation, enroll in a tournament or register to a course, the time it takes to process these requests must not exceed 3 seconds. The time it takes to load different pages must be at most 2 seconds (assuming that the user has a stable and sufficient internet connection). The user will also be accessing a lot of information such as records of their reservations, tournaments, courses, and announcements. Since users will most likely spend most of their time on these things, the time it takes to display these data should not be exceeding 2 seconds. By ensuring such time constraints, the system will be ensured to respond to different requests in a tolerable amount of time.

2.2.4 Supportability

The structure of the system may be used across different platforms and there may be different functionalities that are going to be added in the future according to the changing structure of the Bilkent University Sports Center facilities. In order to ensure supportability, different aspects that are included in the supportability requirement need to be considered. In order to be portable, the system will be implemented in ways that will be supported across different platforms. Also, the system must be able to adapt to changes in the future by using reusable components. These components will allow us to reuse the structures that are created for existing functionalities and use these structures in order to implement different functionalities in an easier, faster, and a reliable way.

2.2.5 Additional Requirements

In order to implement these non-functional attributes into our application, we made some enhancements to our application. First of all, there wasn't any way to search through certain data (such as reservations) which kind of made it hard to find the necessary information. But now, users can easily find the data they are looking for, which increases usability. We have also put some constraints on certain font and button sizes in order to increase the readability of the texts, which again is important for usability. For the reliability, we did not specify how would the passwords be stored. We have decided that they will be stored in an encrypted form. Also, we have specified ways to handle certain situations that can result in data corruption or system crash. For example, the system will have structures that will check the validity of data and if the system recognizes any problem, it will be able to bypass these problems and keep the system running without any corruption. For response time, we haven't specified any time constraints in the first

iteration. Now, we put limits on the time it takes to do certain actions. Moreover, to increase the supportability of our application, we will build our application in a way that it will be able to run across different platforms, which was not a concern of our first iteration.

2.3 System Models [2]

2.3.1. Use Case Model

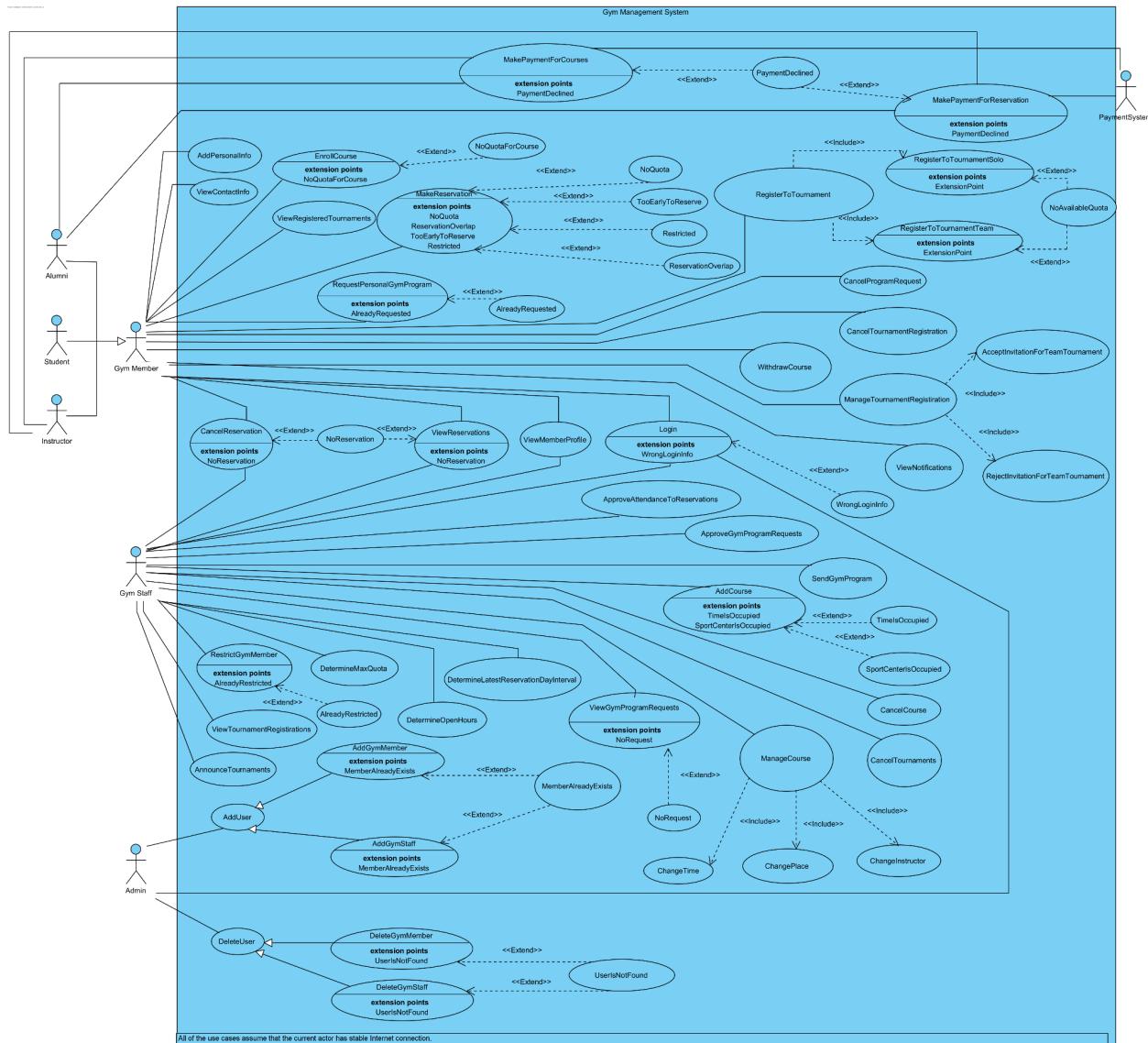


Fig. 1: General Use Case Diagram (Click [here](#) for bigger size)

For all of the uses cases below, the required special requirement is:

- The actor must have a stable internet connection

Name: Login

Participating Actors: Gym Member, Gym Staff, Admin

Entry Condition:

- A valid account exists for the user.

Exit Condition:

- Actor successfully logs in.

Flow of Events:

1. Actor enters username.
2. Actor enters password.
3. Actor's credentials are verified and the actor is logged in to their account.

Special/Quality Requirements:

- Once the user enters credentials, they should be logged in to the system within 0.5 seconds.
-

Name: Make Reservation

Participating Actors: Gym Member

Entry Condition:

- There is enough quota for the desired sports activity and the specified time slot.
- The user has not made another reservation for the same time slot before.
- User is not restricted from making a reservation.

Exit Condition:

- Actor has a reservation and the available quota for that sports activity is decreased.

Flow of Events:

1. Actor chooses the sports activity to make a reservation for.
2. Actor chooses a time slot.
3. Actor has a reservation.

Special/Quality Requirements:

- The user must be registered to the reservation within 0.5 seconds upon submitting the reservation information.
-

Name: Add Personal Info

Participating Actors: Gym Member

Entry Condition: Actor chooses the Edit Personal information option.

Exit Condition:

- Actor's personal information is updated.

Flow of Events:

1. Actor chooses which information to edit
2. Actor edits the information(s).
3. Actor chooses the save option.

Special/Quality Requirements:

- None
-

Name: Request Personal Gym Program

Participating Actors: Gym Member

Entry Condition:

- Actor does not have an already requested gym program.
- Actor is not restricted by Gym Staff.

Exit Condition:

- The textual description of the gym program is sent to the gym staff.

Flow of Events:

1. Actor enters information about their desired program.
2. Actor submits the program request.

Special/Quality Requirements:

- None
-

Name: Register to Tournament

Participating Actors: Gym Member

Entry Condition:

- There is an available quota for the chosen tournament.
- The deadline for the registration is still not passed.

Exit Condition:

- The user is registered to the tournament and the available quota for that tournament is decreased.

Flow of Events:

1. Actor chooses a tournament among the available tournaments.
2. Actor chooses the option to participate in the tournament.

Special/Quality Requirements:

- None
-

Name: View Tournament Registrations

Participating Actors: Gym Staff

Entry Condition:

- There is at least one tournament to be viewed.

Exit Condition:

- The available tournaments are listed to the actor.

Flow of Events:

1. Actor chooses a tournament from the tournament list

2. Actor sees all the participants.

Special/Quality Requirements:

- None
-

Name: View Member Profile

Participating Actors: Gym Member, Gym Staff

Entry Condition: Actor chooses the view member profile option.

Exit Condition:

- The information of the actor is displayed.

Flow of Events:

1. Actor chooses the view profile option.
2. The information related to actor is displayed.

Special/Quality Requirements:

- None
-

Name: Cancel Reservation

Participating Actors: Gym Member, Gym Staff

Entry Condition:

- There must be at least one reservation made to cancel.
- The reservation date is not passed.

Exit Condition:

- Actor's reservation is cancelled and the available quota for the specific activity and time slot is increased.

Flow of Events:

1. Actor chooses a reservation among all the reservations made.

2. Actor chooses the cancel reservation option.
3. Reservation is cancelled

Special/Quality Requirements:

- The desired reservation must be cancelled within 1 second.
-

Name: View Reservations

Participating Actors: Gym Member, Gym Staff

Entry Condition:

- There is at least one reservation to be viewed.

Exit Condition:

- The reservations are displayed to the actor.

Flow of Events:

1. Actor chooses to display the reservations
2. Actor is able to see the reservations.

Special/Quality Requirements:

- None
-

Name: Approve Attendance to Reservations

Participating Actors: Gym Staff

Entry Condition:

- There is at least one reservation to be approved.

Exit Condition:

- The approval status of the selected reservation is successfully updated.

Flow of Events:

1. Actor can see all the reservations and their reservers.
2. Actor can approve or disprove the attendance status
3. The status of the reserver and the reservation is updated.

Special/Quality Requirements:

- None
-

Name: View Gym Program Requests

Participating Actors: Gym Staff

Entry Condition:

- There must be at least one personal gym program request to be viewed.

Exit Condition:

- Gym Program Requests are displayed to the user.

Flow of Events:

1. Actor chooses the option to see reservations
2. The reservations are displayed to the actor

Special/Quality Requirements:

- None
-

Name: Approve Gym Program Requests

Participating Actors: Gym Staff

Entry Condition:

- There is at least one gym program that is requested.

Exit Condition:

- Actor approves the gym program as a valid request and the status of the request is updated as valid.

Flow of Events:

1. Actor is in the gym program requests list.
2. Actor chooses to approve the gym program as a valid program.

Special/Quality Requirements:

- None
-

Name: Determine Latest Reservation Day Interval

Participating Actors: Gym Staff

Entry Condition:

- Actor chooses the edit reservation day interval option.

Exit Condition:

- The latest reservation day interval has been updated.

Flow of Events:

1. Actor edits the reservation day
2. Actor gives input for the desired interval
3. The latest reservation day is updated.

Special/Quality Requirements:

- None
-

Name: Determine Open Hours

Participating Actors: Gym Staff

Entry Condition: Actor chooses the “Determine Open Hours” option.

Exit Condition:

- The open hours have been updated.

Flow of Events:

1. Actor chooses to edit the open hours.
2. Actor gives a valid input for the open hours.
3. The open hours are updated.

Special/Quality Requirements:

- None
-

Name: Determine Max Quota

Participating Actors: Gym Staff

Entry Condition: Actor chooses the Edit Max Quota option.

Exit Condition:

- The max quota of the desired activity has been updated.

Flow of Events:

1. Actor chooses one activity.
2. Actor sets or changes a maximum quota for the chosen activity.
3. The quota is updated for the activity.

Special/Quality Requirements:

- None
-

Name: Restrict Gym Member

Participating Actors: Gym Staff

Entry Condition:

- Actor chooses the “restrict user” option for a specific user.
- The user to be restricted isn’t already restricted

Exit Condition:

- The chosen user’s status is set as restricted.

Flow of Events:

1. Actor chooses a specific gym member from the list of members.
2. Actor restricts the chosen member from using the gym and sports facilities.

Special/Quality Requirements:

- None
-

Name: Announce Tournaments

Participating Actors: Gym Staff

Entry Condition: Actor chooses the “Add a tournament” option.

Exit Condition:

- The tournament to be announced is created and announced for Gym Members.

Flow of Events:

1. Actor specifies the tournament information.
2. A new tournament is added and announced.

Special/Quality Requirements:

- None
-

Name: Add User

Participating Actors: Admin

Entry Condition:

- Actor chooses the “Add User” option.
- The user does not already exist.

Exit Condition:

- A user with a unique id has been created by the actor.

Flow of Events:

1. Actor sees two options as adding a gym member or a gym staff
2. Actor chooses one of these two options

Special/Quality Requirements:

- The creation of the user must not take more than 1 second.
-

Name: Add Gym Member

Participating Actors: Admin

Entry Condition: Actor chooses the “Add Gym Member” option.

Exit Condition:

- A gym member with a unique id has been created by the actor.

Flow of Events:

1. Actor sets the username of the gym member
2. Actor adds the member by their mail address
3. The gym member is created.

Special/Quality Requirements:

- The creation of the gym member must not take more than 1 second.
-

Name: Add Gym Staff

Participating Actors: Admin

Entry Condition: Actor chooses the Add Gym Staff option

Exit Condition:

- A gym member with a unique id has been created by the actor.

Flow of Events:

1. Actor sets the username of the gym staff
2. Actor adds the gym staff by their mail address
3. A gym staff has been added.

Special/Quality Requirements:

- The creation of the gym staff must not take more than 1 second.
-

Name: Delete User

Participating Actors: Admin

Entry Condition:

- Actor chooses Delete User option.
- The user to be deleted exists.

Exit Condition:

- Selected user has been removed.

Flow of Events:

1. Actor chooses a user.
2. Actor chooses the option to delete the user
3. The user has been deleted.

Special/Quality Requirements:

- None
-

Name: Delete Gym Member

Participating Actors: Admin

Entry Condition: Actor chooses Delete Gym User option.

Exit Condition:

- The selected gym member has been removed.

Flow of Events:

1. Actor chooses a gym member.
2. Actor chooses the option to delete the gym member.
3. The gym member has been deleted.

Special/Quality Requirements:

- None
-

Name: Delete Gym Staff

Participating Actors: Admin

Entry Condition: Actor chooses Delete Gym Staff option.

Exit Condition:

- The selected gym staff has been removed.

Flow of Events:

1. Actor chooses a gym staff.
2. Actor chooses the option to delete the gym staff.
3. The gym staff has been deleted.

Special/Quality Requirements:

- None
-

Name: Make Payment For Reservation

Participating Actors: Alumni, Instructor

Entry Condition:

- Actor attempted to make a reservation.

Exit Condition:

- Payment has been accepted and the reservation is created for the actor.

Flow of Events:

1. Actor attempts to make a reservation.
2. Actor enters the credit card information.
3. Actor submits the payment request.

Special/Quality Requirements:

- The user must have enough money in their credit card.
-

Name: Enroll Course

Participating Actors: Gym Member

Entry Condition:

- Actor chooses the Enroll Course option for a specific course
- There is enough available quota for the course.

Exit Condition:

- Actor has been enrolled to the course.

Flow of Events:

1. Actor chooses a course.
2. Actor chooses the enroll course option.

Special/Quality Requirements:

- None
-

Name: Withdraw Course

Participating Actors: Gym Member

Entry Condition:

- Actor is enrolled to at least one course.

Exit Condition:

- Actor withdraws from the selected course.

Flow of Events:

1. Actor chooses a course.
2. Actor selects the withdraw option.
3. Actor withdraws from the course.

Special/Quality Requirements:

- None

2.3.2. Object Models and Class Diagram

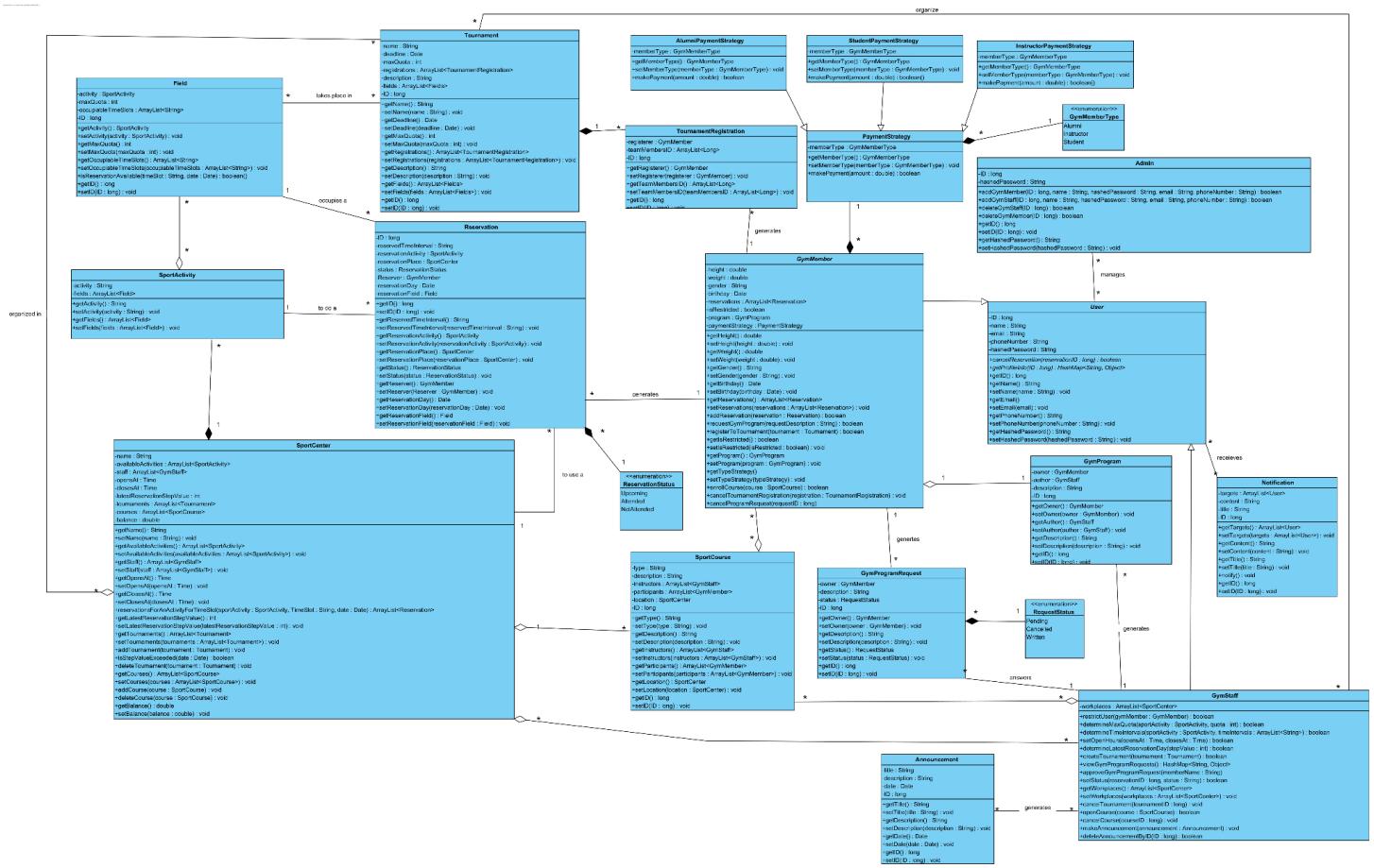


Fig. 2: Class Diagram (Click [here](#) for bigger size)

Explanation

The whole application can be thought to be handled by two classes: User and SportCenter. As the name suggests, User class is mainly responsible for holding information about all the users who have access to the system. It also includes some operations related to reservations and consists of two classes: GymMember and GymStaff. GymMember is the basic user that is to be used by anyone who is willing to use the Bilkent University gyms and sports facilities. It has attributes related to a gym user's physical traits, and also allows the gym member to perform various operations such as making or canceling a Reservation and or some other operations as well such as attending to a Tournament as well as a SportCourse. Different types of gym members such as Instructor, Alumni, and Student. These different types of gym members are represented by an enumeration attribute in the GymMember class. By checking the enumerations, the system will display different UI and provide different functionalities to the users. GymMember itself has three different payment strategies: StudentPaymentStrategy, AlumniPaymentStrategy, and

`InstructorPaymentStrategy`. `StudentPaymentStrategy` is empty, `Alumni` and `Instructor` payment strategies are depending on the `SportCenter` as well as the time of the day based on our requirements analysis. `GymStaff` class on the other hand is used to represent the staff working in Bilkent University gyms and sports facilities. They have access to various information about the gym and have permission to change or edit them. There is also another class called `Admin`, which is separate from a regular user. `Admin` class represents a class for an admin user whose tasks are to add new User's to the system as well as their property management.

On the other hand, `SportCenter` can be considered as the main class that is responsible for the operations related to sports activities, tournaments, and sports courses. It has `GymStaff` as the children class, hence the gym staff can also access the information related to these topics. Also, there can be many tournaments on the campus, hence the `SportCenter` class is in a 1-to-many association with the `Tournament` class. `Tournament` class is the class used to represent a single tournament with various attributes related to tournament details. There is also the `TournamentRegistration` class which is a part-of `Tournament`, which is used to display the participants and their information of a tournament if a tournament exists. Another class is `SportActivity`, which is a part-of `SportCenter` class, and represents a sports activity and its details. `SportCenter` also has a `SportCourse` class, which represents the sports courses taking place at the campus to which members can enroll to. `Field` is the place where a `SportActivity` is done within a Reservation. Finally, there is the `Reservation` class which holds all the information related to a reservation and includes some operations to retrieve the information of a particular reservation. `GymProgramRequest` class represents the gym program request that is going to be sent by the `GymMembers` to `GymStaff`. Since the `GymMember` will be able to request a specific gym program from `GymStaff`, this class will hold the necessary information and explanations which includes information about the desired gym program.

2.3.2.1 Controller Class Example

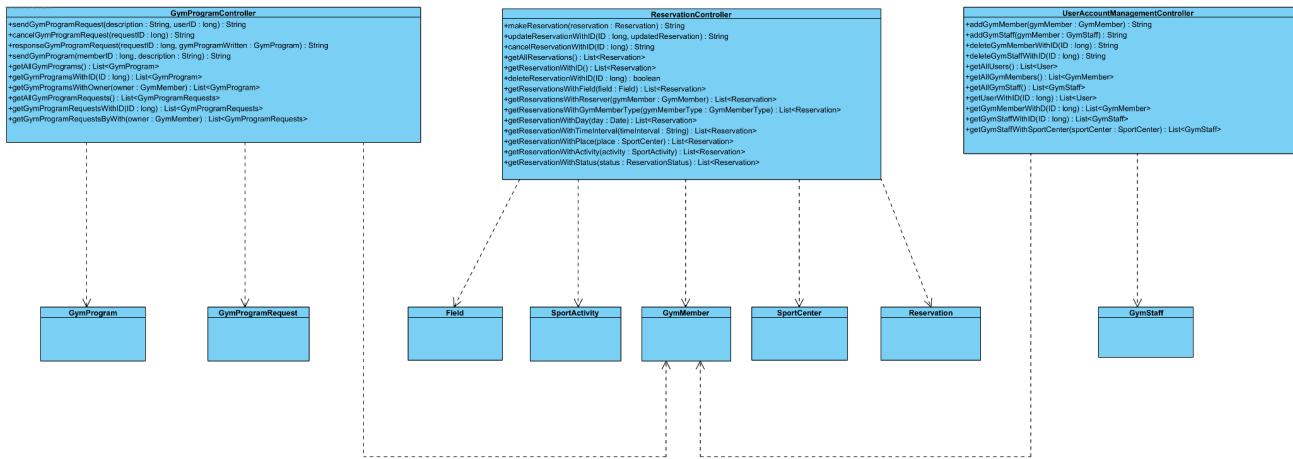


Fig. 3: Example Controller Classes (Click [here](#) for bigger size)

Here are some example controller classes: GymProgramController, ReservationController and UserAccountManagementController. They will be a roadmap for the controller classes that will be created for the design report. The remaining controller classes will be included in the design report. Basically, each controller classes access and use several object(entity) classes to receive or manipulate data. In that way, wanted operations will be done. For example, when someone makes a reservation, ReservationController will invoke and make necessary data changes in the Field, SportActivity, GymMember, SportCenter, and Reservation objects.

2.3.3. Dynamic Models

2.3.3.1 Activity Diagrams

2.3.3.1.1 Reservation Activity

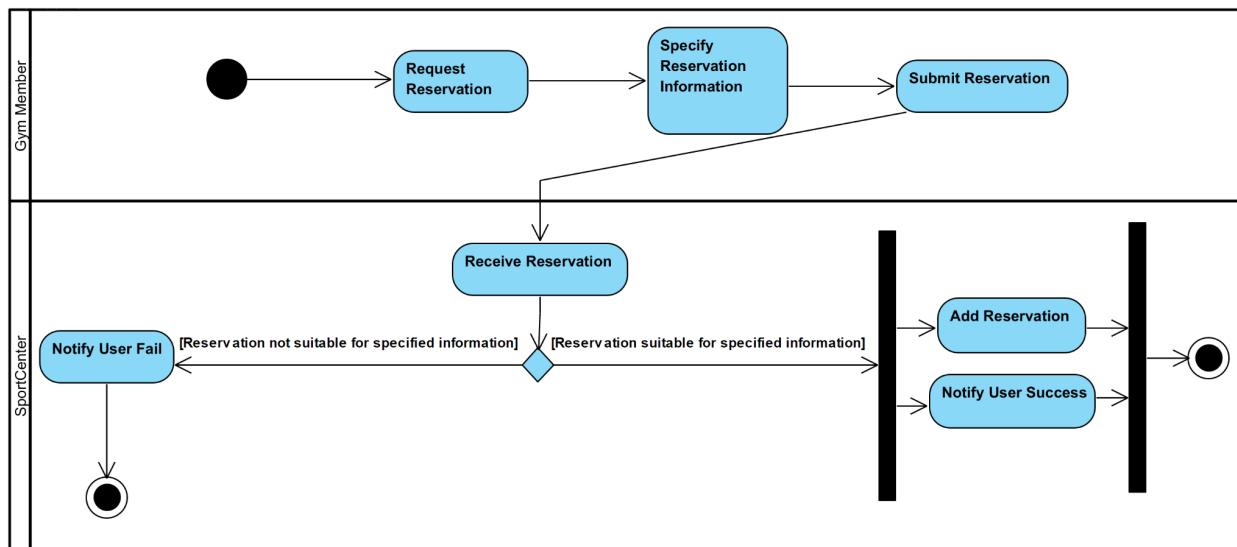


Fig. 4: Reservation Activity

When a gym member decides to make a reservation, they can easily do so by clicking the “Make a Reservation” button and then specifying the reservation information such as when and which sports activity. Once they are done and submitted, the SportCenter receives this request and checks whether it is suitable to make the reservation. For example if for that time slot the maximum number of gym members already have made a reservation or if the user has another reservation for that exact time slot, making a reservation operation is failed and the user is notified. Otherwise, the reservation is added to the system and the user is notified concurrently.

2.3.3.1.2 Tournament Activity

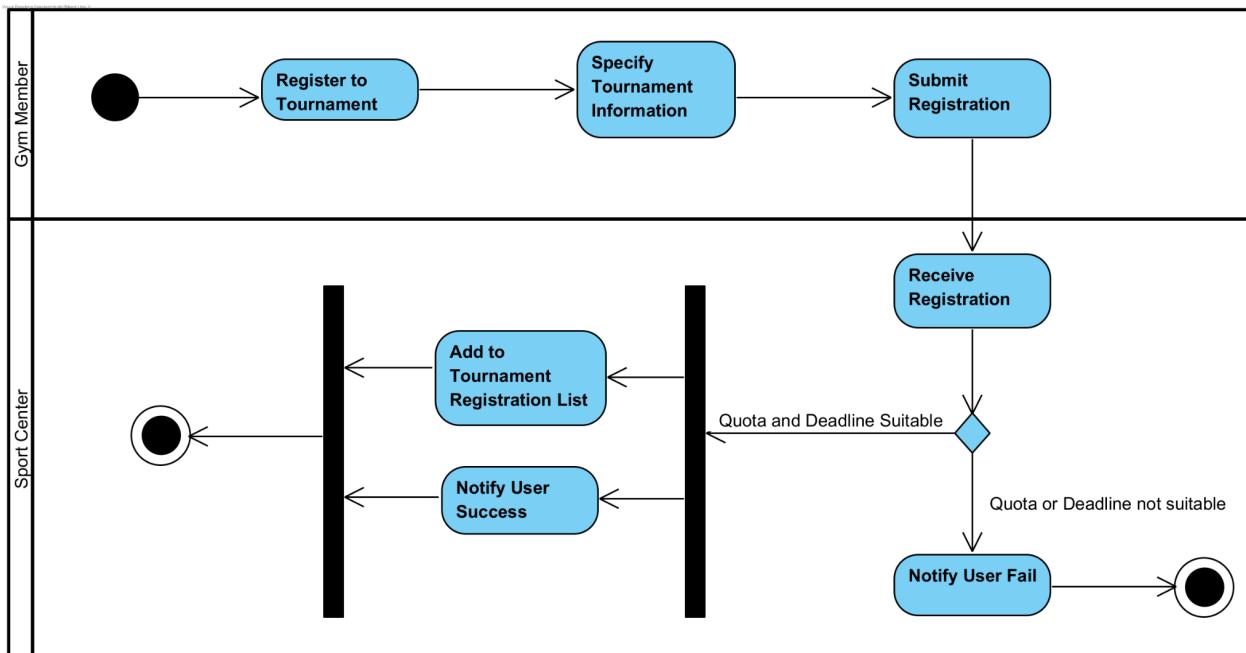


Fig. 5: Tournament Activity

If a gym member ever wants to participate in a tournament, they can click on “Register to a Tournament” and then choose the tournament they want to attend by viewing the tournament’s details. Once they make their decision, the registration request is submitted to and received by the SportCenter. Then it is checked whether it is suitable to participate in the tournament or not. If not, the user is notified about the situation. Otherwise, the user is added to the registration list for that tournament and notified concurrently, and then the activity finishes.

2.3.3.1.3 Gym Program Activity

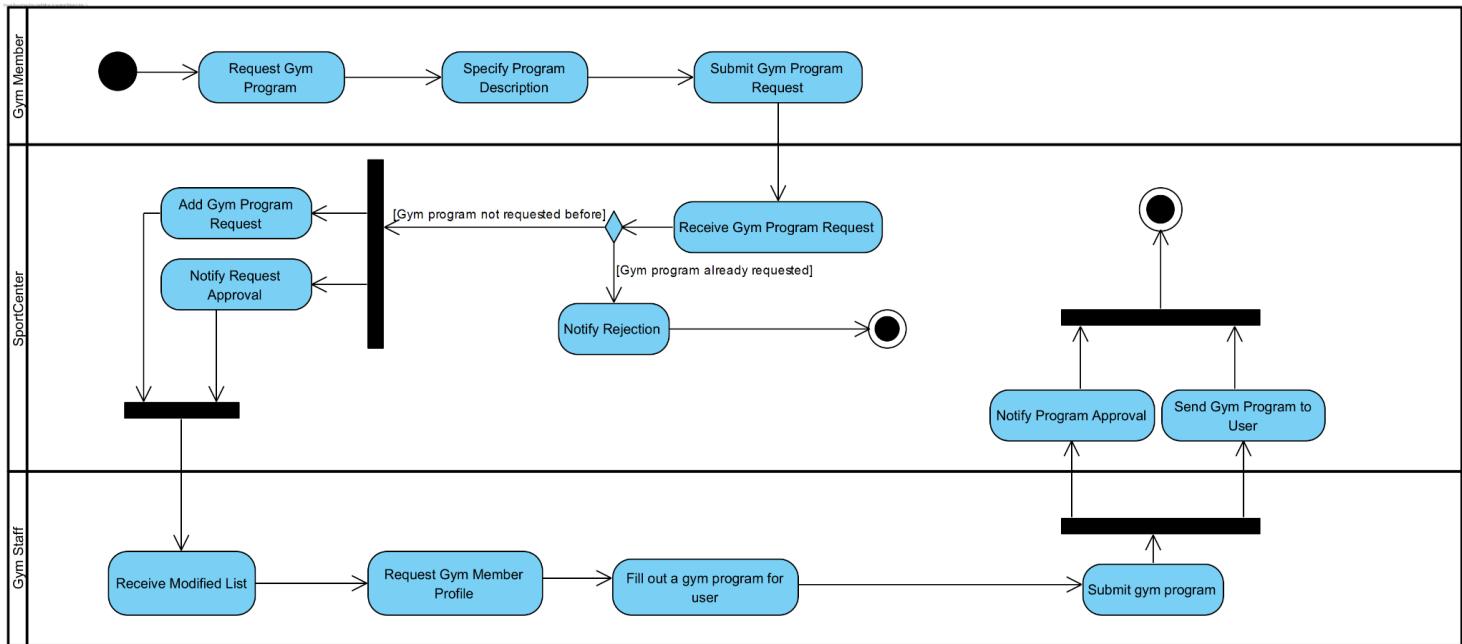


Fig. 6: Gym Program Activity

A gym member who wants to receive a gym program from the gym staff clicks on the “Request Gym Program”, writes a detailed description of their needs, and submits a request to the SportCenter by simply clicking a button. Once the request is received, it is checked whether there has been a request by the same member before, and the request is rejected if that is the case. Otherwise, if this is the member’s first request, the request is added to the system and the gym member is notified concurrently so that they are aware their gym program request is approved. Then, the gym staff has access to the updated list of all gym program requests, and from there they can access gym members’ profiles. After that, the gym staff can write a program for the gym member, and then the activity finishes when the staff sends the program to the user.

2.3.3.2 Sequence Diagram

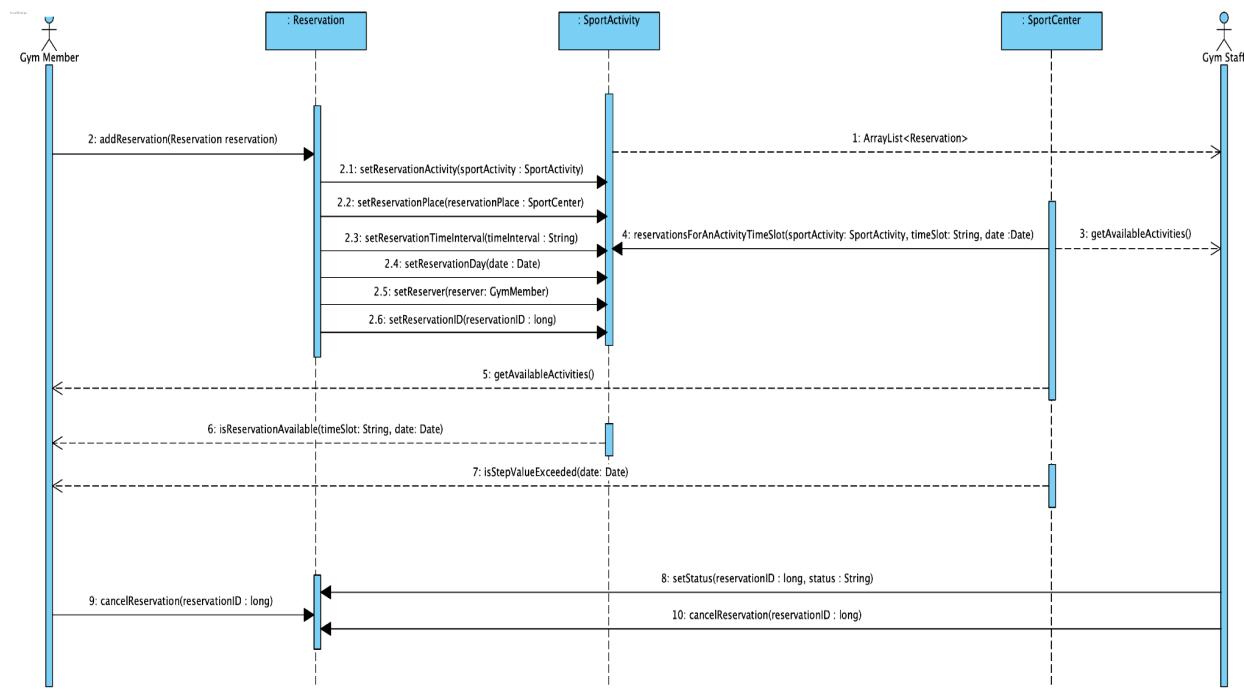


Fig. 7: Reservation Sequence Diagram

2.3.3.3 State Diagram

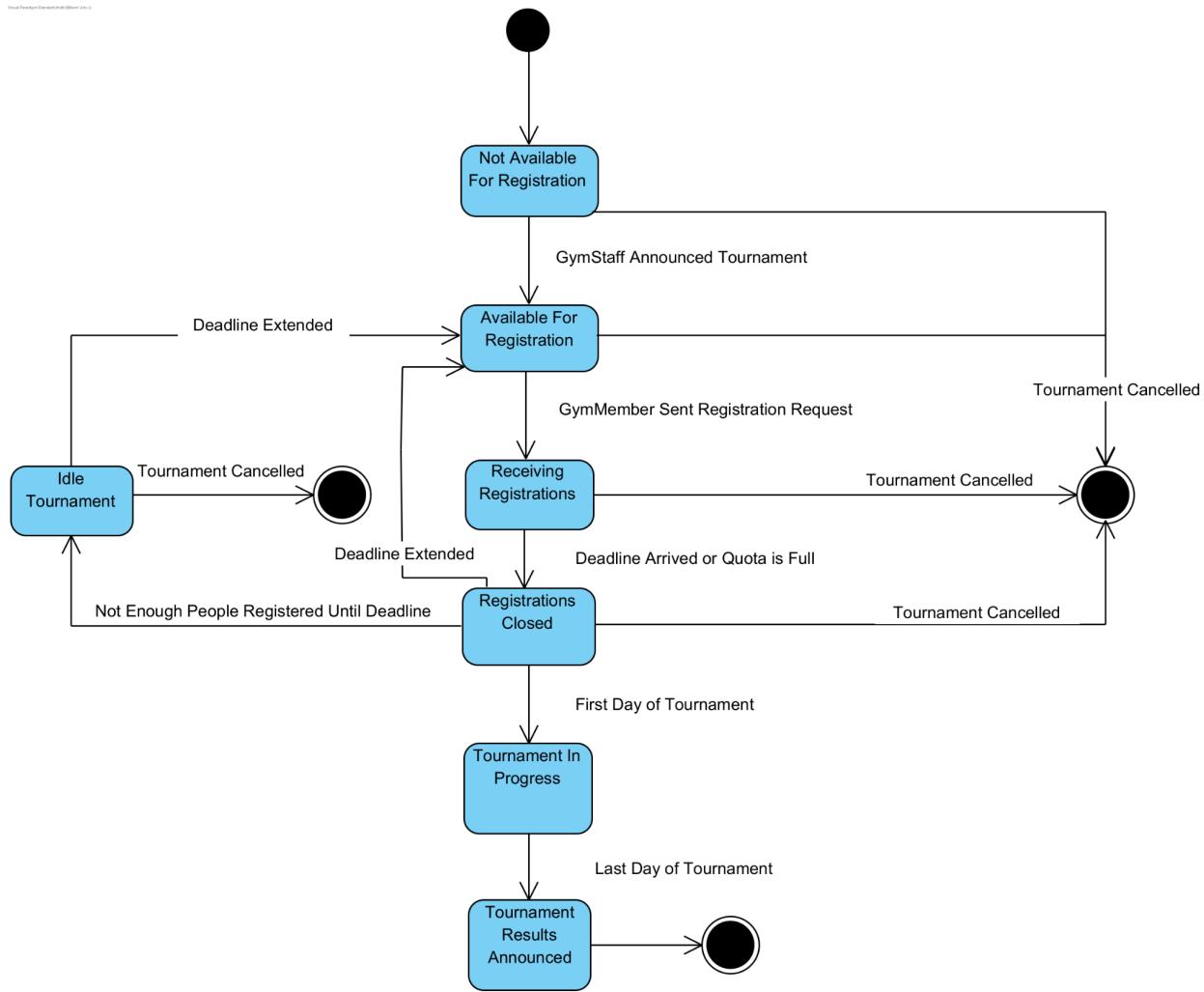


Fig. 8: Tournament Registration State Diagram

This diagram illustrates the states of a Tournament object. At first, when the tournament is not announced yet by a gym staff, its registrations are closed. Once the gym staff announces the tournament, the tournament moves on to the next state and it becomes available for registrations. During this state, gym members can register to the tournament and this moves the tournament object to the next state in which it receives registrations. Once the deadline specified by the gym staff arrives, tournament's registrations get closed. During this stage, if the gym staff decides to extend the deadline, the tournament object moves back to the state where it is again available for registrations. Also, if not enough people register for the tournament, the tournament moves to a different state and from there the deadline can be extended. During all these stages, there is the possibility of the cancellation of the tournament due to several reasons. If no deadline extension or cancellation happens, however, the tournament starts on the specified starting day, and hence

the object moves to the next stage in which the tournament progresses. Once the tournament ends, the final state comes and the tournament results are announced.

2.3.4. User Interface

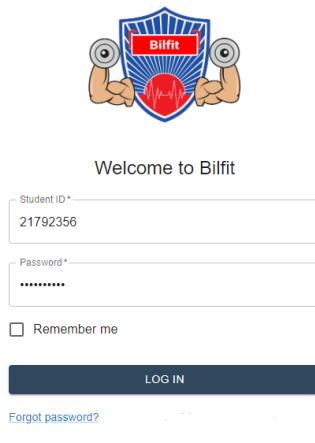


Fig. 9: Log in UI

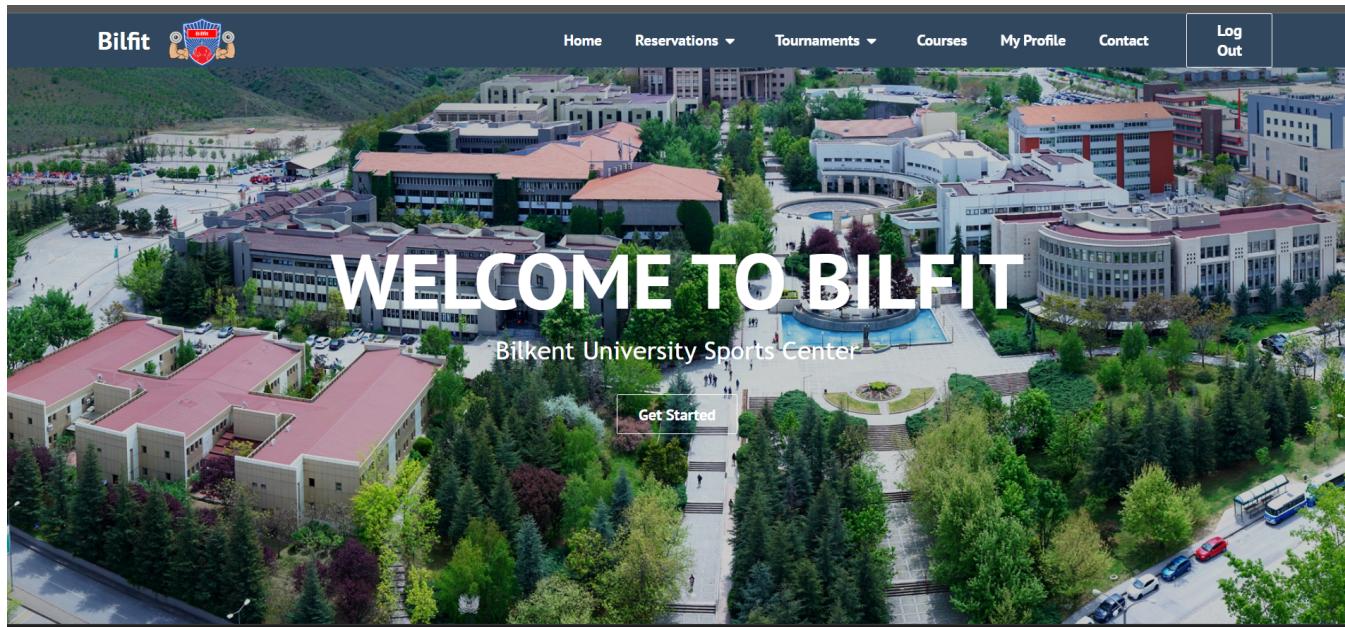


Fig. 10: Main Page UI

The image shows the reservation interface for the Bilfit website. The top navigation bar is identical to Fig. 10. On the left, there is a sidebar with buttons for "Sports Center" (highlighted in red), "Main Campus" (highlighted in blue), "Dorm", and "East Campus". The main content area has a "Sports Activity" sidebar on the left with options: Archery Polygon, Basketball, Volleyball (highlighted in blue), Fitness, Squash, Martial Arts, Swimming, and Table Tennis. To the right of the sidebar is a calendar for April 2022, showing days from 1 to 30. Below the calendar, there is a "Select Time Slot" section with three radio button options: "13:30-15:30", "16:30-18:30" (selected), and "19:30-21:30". At the bottom of the page is a "MAKE RESERVATION" button.

Fig. 11: Make a Reservation UI

Reservation Date	Reservation Time	Reservation Activity	Reservation Location	Reservation Sport Center	Reservation Status		
13/11/2022	13:30-14:45	Basketball	Ground	Main	Attended		
14/11/2022	15:30- 16:45	Volleyball	1st Floor	East	Attended		
15/11/2022	13:30-14:45	Tennis	Ground	Dormitory	Attended		
19/11/2022	17:30-18:45	Tennis	Ground	Main	Waiting		
21/11/2022	20:30-21:45	Basketball	2nd floor	Main	Waiting		

Fig. 12: My Reservations UI

Reservation Date	Reservation Time	Reservation Activity	Reservation Sport Center	Reservation Location	Reserver Name	Reserver Phone	Reserver ID	Reservation Status		
13/11/2022	13:30-14:45	Volleyball	Main	Ground	Fahri Koray	5501002030	21901111	Attended		
14/11/2022	15:30- 16:45	Football	East	1st Floor	Zeynep Kara	5501002032	21902222	Waiting		
15/11/2022	13:30-14:45	Fitness	Main	Ground	Mira Beylice	5351002042	21901725	Waiting		
16/11/2022	13:30-14:45	Volleyball	Main	Ground	Ahmet Kurduken	5271112056	21703333	Waiting		

Fig. 13: Total Reservations UI from the gym staff eyes

Halit Eren Körgezen

Edit Profile

Change Password

ID:	21902222
Gender:	Male
Birthdate:	17 July 2000
Weight:	80.3
Height:	180
Phone Number:	5501002032
Email:	h.korgezen@ug.bilkent.edu.tr

Fig. 14: My Profile UI

Available Tournaments

Tournaments Date	Tournaments Time	Tournaments Activity	Tournaments Location	Sport Center	Tournament Status
13/11/2022	13:30-14:45	Badminton	Ground	Main	30/11/2022 (6)
14/11/2022	15:30-16:45	Volleyball	1st Floor	East	30/11/2022 (9)
15/11/2022	13:30-14:45	Tennis	Ground	Dormitory	30/11/2022 (7)
19/11/2022	17:30-18:45	Tennis	Ground	Main	30/11/2022 (10)
21/11/2022	20:30-21:45	Basketball	2nd floor	Main	30/11/2022 (4)

Fig. 15: Tournaments UI from the eyes of gym member

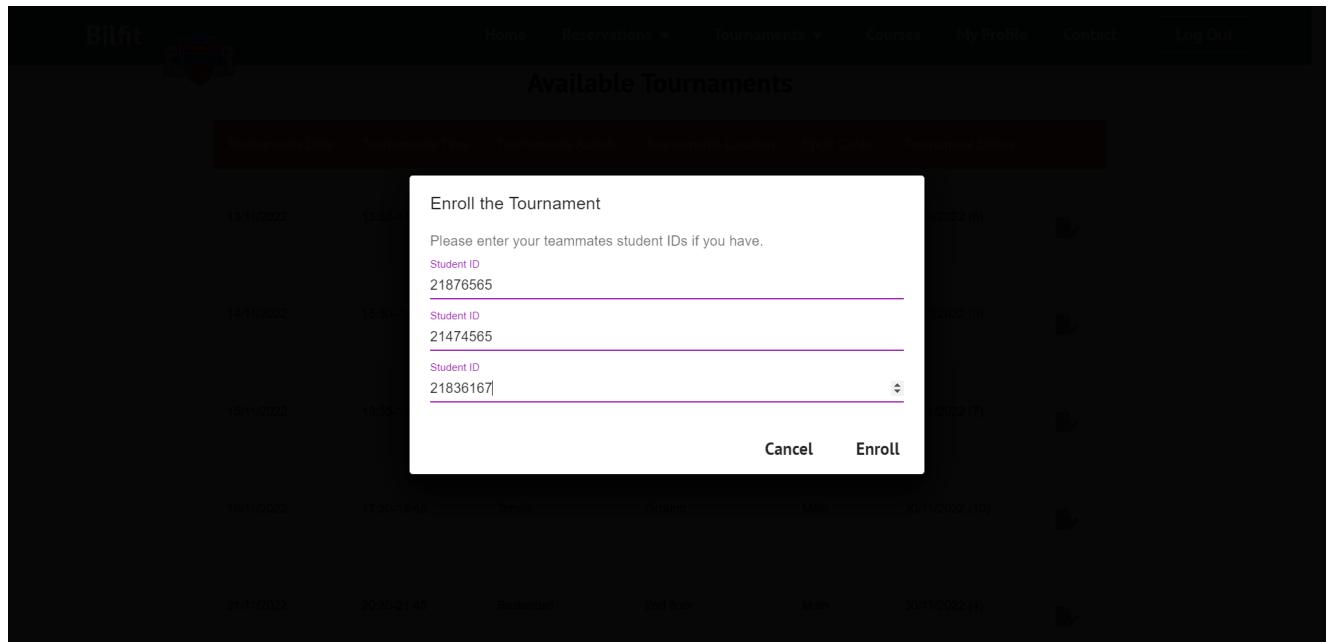


Fig. 16: Enroll Tournament UI from the eyes of gym member

This screenshot shows the 'Available Tournaments' section of the Bilfit website. A modal window titled 'Add Tournament' is open. The table below lists four tournaments with columns for Date, Time, Activity, Location, and Capacity.

Tournaments Date	Tournaments Time	Tournaments Activity	Tournaments Location	Tournaments Status
13/11/2022	13:30-14:45	Volleyball	Ground	Main 15/05/2022 (6) X
14/11/2022	15:30- 16:45	Football	1st Floor	East 15/05/2022 (11) X
15/11/2022	13:30-14:45	Fitness	Ground	Main 15/05/2022 (6) X
16/11/2022	13:30-14:45	Volleyball	Ground	Main 15/05/2022 (6) X

Fig. 17: Tournaments UI from the eyes of staff

The screenshot shows a modal window titled "Add a Tournament". The instructions say "Please enter the necessary information of tournament." The form fields include:

- Tournament Date: 01.05.2022
- Tournament Time: 12:30
- Tournament Activity: Volleyball
- Tournament Location: Open Air
- Sport Center: Main Sport Center (dropdown menu)
- Last Registration Date: 10.05.2022
- Tournament Max Group or Person: 10

At the bottom are "Cancel" and "Add" buttons. In the background, there's a list of tournaments with their status (e.g., 0/11/2022 (6), 0/11/2022 (9), etc.) and delete icons.

Fig. 18: Add Tournament UI from the eyes of staff

The screenshot shows a table titled "My Tournaments" with the following data:

Tournament Date	Time	Activity	Location	Sport Center	Team Members	Status	
13/11/2022	13:30-14:45	Volleyball	Ground	Main	Fahri Koray Mira Beylice Merih Demiral	Waiting	
14/11/2022	15:30- 16:45	Football	1st Floor	East	Fahri Koray	Waiting	

Fig. 19: My Tournaments UI from the eyes of gym member

My Pending Requests

Requester	Date	Time	Activity	Location	Sport Center	Team Members	Tournament Status
Fahri Koray	13/11/2022	13:30-14:45	Volleyball	Ground	Main	Fahri Koray Mira Beylice Merih Demiral	Waiting ✓ ✗
Zeynep Kara	14/11/2022	15:30- 16:45	Football	1st Floor	East	Fahri Koray	Waiting ✓ ✗

My Sent Requests

Team Members	Date	Time	Activity	Location	Sport Center	Status
Fahri Koray Mira Beylice Merih Demiral	13/11/2022	13:30-14:45	Volleyball	Ground	Main	Waiting (6) ✓ ✗
Fahri Koray	14/11/2022	15:30- 16:45	Football	1st Floor	East	Waiting (11) ✓ ✗

Fig. 20: Requests for Tournaments UI from the eyes of gym member

Enrolled Tournaments

Tournament Date	Time	Activity	Location	Sport Center	Team Member Numbers	Team Members	Status
13/11/2022	13:30-14:45	Volleyball	Ground	Main	6	Fahri Koray Mira Beylice Merih Demiral	Waiting ✗
14/11/2022	15:30- 16:45	Football	1st Floor	East	11	Fahri Koray	Waiting ✗

Fig. 21: All enrolled Tournaments UI from the eyes of gym staff

Bilfit			Home	Reservations ▾	Tournaments ▾	Courses	My Profile	Contact	Log Out
Add User									
All Users									
User ID	User Mail	User Full Name	User Phone Number	User Birth Date	User Gender	User Weight	User Height		
mahmutenkaz@ug.bilkent.edu.tr	21901111	Mahmut Enkaz	5501002030	15 May 2001	Male	85.3	165		
h.korgezen@ug.bilkent.edu.tr	21902222	Halit Eren Körgezen	5501002032	17 July 2000	Male	80.3	180		

Fig. 22: All Users UI from the eyes of admin

Bilfit			Home	Reservations ▾	Tournaments ▾	Courses	My Profile	Contact	Log Out
Add User		<div style="border: 1px solid #ccc; padding: 10px;"> <h3>Add User</h3> <p>Please enter the necessary information of the new user.</p> <p>User ID *</p> <input style="width: 100%; border: 1px solid #ccc; height: 25px; margin-bottom: 5px;" type="text" value="User ID"/> <p>User Full Name *</p> <input style="width: 100%; border: 1px solid #ccc; height: 25px; margin-bottom: 5px;" type="text" value="User Full Name"/> <p>User Mail *</p> <input style="width: 100%; border: 1px solid #ccc; height: 25px; margin-bottom: 5px;" type="text" value="User Mail"/> <p>User Birth Date *</p> <input style="width: 100%; border: 1px solid #ccc; height: 25px; margin-bottom: 5px;" type="text" value="gg.aa.yyyy"/> <p>Select User Gender *</p> <div style="border: 1px solid #ccc; width: 150px; height: 30px; margin-bottom: 5px;"></div> <p>Please select Gender</p> <p style="text-align: right;">Cancel Add</p> </div>							

Fig. 23: Add User UI from the eyes of admin

Available Sport Courses						
Activity	Program	Sport Center	Location	Last Registration	Available Quota	
Pilates	Monday: 13:30- 14:30 Thursday: 15:30-17:30	Main	Ground	Attended	6	
Yoga	Tuesday: 13:30- 14:30 Friday: 15:30-17:30	East	1st Floor	Waiting	11	
H.I.I.T	Monday: 15:30- 16:30 Thursday: 13:30-14:30	Main	Ground	Waiting	6	
Zumba	Tuesday: 14:30- 15:30 Friday: 16:30-17:30	Main	Ground	Waiting	6	

Fig. 24: Available Sports Courses from the eyes of users

All Gym Programs	
Fahri Koray	^
Hello. I just want to shape my body and gain muscles. My weight is 80 kg and my height is 178cm. I have never gone to gym during my life. However, I am very passionate to be fit this time. I can go to gym every day minumum 2 hours. I have no health issues that prevent me from doing cardio or lifting weights. I am waiting for good exercise program from you. Thank you, have a good day :)	
Mira Beylice	^
Merih Demiral	^
Zeynep Kara	^

Fig. 25: All Gym Program Requests from the eyes of staff

3. Improvement Summary

In the second iteration, we have made some additions according to the feedback gathered from our TA, Instructor, Sibling Group, and our own observations.

3.1 Fonts & Typos

- We have fixed some typos and font problems that have occurred in certain explanations and diagrams.

3.2 Functional Requirements

- Registering, Cancelling and Withdrawing a Course.
- Gym Staff will be able to write a gym program and send it to the Gym Member.
- Explanation of Actors, addition of Actor types such as Alumni, Instructor, and Student.

3.3 Nonfunctional Requirements

- We added testable nonfunctional requirements and also we have provided more concrete examples of how we are going to ensure these nonfunctional requirements (More detailed in Additional Requirements section [2.2.5]).

3.4 Use Case Diagram

- Addition of Instructor, Student, and Alumni actor types.
- Payment use case for reservations that are done by Instructor and Alumni is added.
- Use cases about Courses are added (Gym Staff=> Add Course, Gym Member => Enroll Course, Gym Member => Withdraw Course, Gym Staff => Cancel existing course).
- Gym Staff will be able to send gym programs to Gym Members, and use cases related to gym programs are enriched.

3.5 Activity Diagram

- Certain typos and font issues were handled
- Some ambiguity in the textual description of transitions between activities are handled.

3.6 State Diagram

- Tournaments now states can be cancelled.
- When not enough people register for a tournament, the tournament deadline can be extended or it can be cancelled.

3.7 Class Diagram

- Addition of enumeration for different users.
- Addition of PaymentStragety for different types of users (InstructorPaymentStrategy, StudentPaymentStrategy...).
- Addition of classes related to Sport Courses.
- A class for the field information of the sport activity that takes place has been added.
- Classes that are related to Gym Program Request have been added.
- Classes related to Notification and Announcement have been added.

3.8 UI Mockups

- The UI mockups for every screen have been added.

4. Appendix

Appendix A - Interview with Gökmen Güner

Here is a translated version of our interview with Aydin Gökmen Güner who is sports facilities supervisor. S1 and S2 represent the group members.

S1: Hello Mr. Gökmen, thank you for your time firstly. We will make a project about gym management as a term project and we want to get information about the gym management system, its requirements, principles, and features that you want to have.

Gökmen Güner: Yes, of course. I would like to discuss the topic with you, guys. We need an application because it is hard to direct all of the parts of the gym. Your application can be useful for us.

S2: First of all, how does the reservation process work in the gym center? Are they handled by phone calls or is there any other way to make or cancel reservations?

Gökmen Güner: We get reservations from phones or in the gym center and we save them manually. If they want to cancel, they have to call us again and we delete their reservations manually again. Their reservation dates can be at most two days later from the current date, further dates are not allowed.

S2: Is there any punishment system for those who don't come at their reserved time?

Gökmen Güner: If they come to the gym at their reserved time, we mark their names manually. We don't have a punishment system yet for those who don't come at their reserved time.

S1: Then, if we talk more generally, what are gym facilities and features?

Gökmen Güner: We have three gym centers: East, Main, and Dormitories Gym Center. They have different facilities. I will generally talk about the Dormitory Gym Center. We have areas for the swimming pool, fitness center, ping pong, volleyball, basketball, football, box, and squash. The fitness center can be used by 40 people at the same time. Every fitness session has a period of one hour and fifteen minutes. The swimming pool is for 6 people. There are 3 tables for ping pong. There are also 8 basketball hoops. Moreover, we have outdoor areas for activities. You can find other details which you can access on our website.

S2: How do we make sports course reservations? Can we make these reservations every time or is there any specified time for registration? If there is a specified time, how do users get notified about it?

Gökmen Güner: They cannot make reservations every time because these courses generally last at least three or four weeks. These are decided according to conditions. We send mail to users from BAIS to notify them.

S1: Thank you hocam, also we would like to ask if you have any suggestions for the system that you think is important? Your opinions are important for us.

Gökmen Güner: I think you can create my reservations page so users can see their reservations and they can cancel them easily. Also, you probably will need to separate the gym centers so that the users can make reservations to these different facilities independently.

S1 and S2: Thank you so much for your time Mr. Gökmen!

Gökmen Güner: My pleasure.

5. Glossary and References

- [1] Chang, Bo; Xu, Renmei; and Watt, Tiffany (2018). "The Impact of Colors on Learning," Adult Education Research Conference. <https://newprairiepress.org/aerc/2018/papers/30>.
- [2] Object-Oriented Software Engineering, Using UML, Patterns, and Java, 2nd Edition, by Bernd Bruegge and Allen H. Dutoit, Prentice-Hall, 2004, ISBN: 0-13-047110-0.